REMARKS

I. Application Status

Claims 17-41 are pending in the *Subject Application*. Claims 17, 24, 32, and 33 are independent claims.

Claims 32, 33, and 38-40 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,944,985 to Alexander et al. ("*Alexander*").

Claims 17-41 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,759,737 to Feilchenfeld et al. ("*Feilchenfeld*") in view of *Alexander* and U.S. Patent No. 3,185,589 to Damm et al. ("*Damm*").

Applicant respectfully traverses all rejections. Applicant respectfully requests reconsideration, withdrawal of the rejections, and allowance of the *Subject Application*. All references to the "*Specification*" herein refer to the substitute specification filed on April 28, 2004 in the *Subject Application*.

II. Claim Amendments

Independent claim 32 is amended to recite "nanofillers consisting of copper." Independent claim 33 is amended to recite "nanofillers selected from the group consisting of copper nanofillers, silver nanofillers, gold nanofillers, palladium nanofillers, platinum nanofillers, and combinations thereof; wherein the nanofillers are coated with a layer of material that is compatible with the matrix, the coating comprising a material selected from the group consisting of a polymer and a monomer." Support for the amendments is found in the *Specification* at paragraphs [0005], [0010], and [0032]-[0037].

It is believed that the amendments do not add new matter to the *Subject*

Application and are fully compliant with 35 U.S.C. §§ 112 and 132(a). The amendments are made without prejudice or disclaimer. The amendments are made solely to expedite the prosecution of the *Subject Application*.

III. Claim Rejections under 35 U.S.C. § 103(a)

To establish a *prima facie* case of obvious, the cited references must expressly or impliedly teach or suggest the claimed invention, or the Office must present a rational line of technical reasoning based on factual evidence showing why a person having ordinary skill in the relevant art would have found the claimed invention to have been obvious in view of the teachings of the cited references. *MPEP* §§ 2142 and 706.02(j). Rejections on obviousness grounds cannot be sustained with mere conclusory statements or unsupported assertions. The Office must clearly communicate logical reasoning with rational underpinnings based on a preponderance of factual evidence to support the legal conclusion of obviousness. *See* MPEP § 2142, citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Applicant respectfully submits that *Feilchenfeld*, *Alexander*, and *Damm*, alone or in combination, do not establish a *prima facie* case of obviousness for the subject claims.

A. Rejection of independent claims 32 and 33 over *Alexander*

Independent claim 32 recites "nanofillers consisting of copper."[1] Independent claim 33 recites "nanofillers selected from the group consisting of copper nanofillers, silver nanofillers, gold nanofillers, palladium nanofillers, platinum nanofillers,

[1] Please note that the recitation of "nanofillers consisting of copper" does not exclude the inclusion of other particles to the recited compositions in addition to the recited particles. Rather, this recitation requires the inclusion of nanofillers that consist of copper in addition to any other optional particles that may be included by virtue of the "comprising" transitional phrases in the preambles. Further, the "consisting of" transitional phrase does not exclude impurities ordinarily associated with copper. *See MPEP* § 2111.03.

and combinations thereof." The nanofillers recited in independent claims 32 and 33 exclude elements other than the specified metals and impurities ordinarily associated therewith. *MPEP* § 2111.03. *Alexander* does not teach or suggest such nanofillers.

On the contrary, *Alexander* teaches core-and-shell type composite particles in which chemically reducible metals (*i.e.*, via oxidation-reduction (redox) reactions) are plated onto the surface of an inert core particle to form a metal shell surrounding the core particle. *Alexander* at c. 3, l. 64 – c. 4, l. 19. The core particle is formed of "a material that will not react rapidly with the aqueous solution." *Id.* at c. 4, ll. 17-19. The aqueous solution comprises oxidized metal to be reduced and plated onto the core particles. *Id.* at c. 4, ll. 4-7. Thus, *Alexander* teaches particles consisting of a shell of metal plated onto a core particle of a different non-reactive material such as silica, (*i.e.*, silicon dioxide), alumina (*i.e.*, aluminum oxide), and zirconia (*i.e.*, zirconium oxide). *Id.* at c. 6, ll. 21-40; and Examples 1-11.

Alexander does not teach or suggest nanofillers consisting of the metals specified in claims 32 and 33 of the *Subject Application*. On the contrary, *Alexander* teaches composite particles requiring components and elements that form the core in addition to the metal surface plating surrounding the core. Consequently, *Alexander* does not establish a *prima facie* case of obviousness for independent claim 32 and 33. Therefore, Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. § 103(a) of claims 32 and 33 and their dependent claims.

B. Rejection of independent claims 17, 24, 32, and 33 over Feilchenfeld in view of Alexander and Damm

Independent claims 17, 24, 32, and 33 recite that the fillers "are coated with a layer of material that is compatible with the matrix, the coating comprising a material selected from the group consisting of a polymer and a monomer." The combination of *Feilchenfeld*, *Alexander*, and *Damm* does not teach or suggest such coated nanofillers incorporated into a screen printable formulation comprising "a matrix

comprising a polymer material," as recited in the subject claims.

In support of the reference combination used to reject the subject claims, the *Office Action* states that:

> At the time the invention was made a person having ordinary skill in the art would be motivated to coat the metallic particles of Feilchenfeld using a polymer material, such as the thermoplastic resins of Damm, also taught by Alexander. Damm provides adequate suggestion and motivation to employ polymer coated metallic particles in order to produce inks having superior printing characteristics as taught therein. Despite the fact that Feilchenfeld, Alexander and Damm teach different types of ink formulations, a person having ordinary skill in the art recognizes all three prior art references teach screen printable formulations and hence their respective components are interchangeable to the degree necessary in order to promote innovation and achieve superior results.

Office Action at p. 7. Applicant respectfully submits that this asserted rationale for modifying the invention disclosed of *Feilchenfeld* is improper.

First, the above statement is a mere conclusory statement and an unsupported assertion that does not articulate logical reasoning with rational underpinnings based on a preponderance of factual evidence to support a legal conclusion of obviousness. *See MPEP* § 2142. The Office provides no evidence that supports the assertion that the respective components disclosed in the cited references are interchangeable in an operable manner. The burden is on the Office to provide factual evidence that supports the technical assertions presented in an Office action. Otherwise, a claim rejection under 35 U.S.C. § 103(a) would be based on speculation, which is impermissible. *See KSR*, 550 U.S. at 418; *MPEP* § 2142.

Second, the Office's statement to the effect that the prior art teachings may be modified or combined "to the degree necessary in order to promote innovation

and achieve superior results" is equal to merely stating that modification of the prior art to meet the claimed invention would have been well within the ordinary skill of the art. However, as stated in MPEP § 2143.01(IV):

> A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is **not** sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references.

(Emphasis added). Further, MPEP § 2143.01(I) states that "[o]bviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so." Here, the Office's unsupported and conclusory statement reproduced above does not provide any objective teaching, suggestion, motivation, or other reason to combine *Feilchenfeld*, *Alexander*, and *Damm* in the manner asserted.

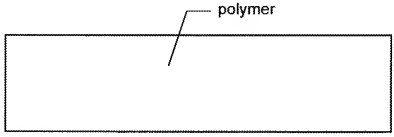
Third, the Office's statement is factually incorrect because a person having ordinary skill in the art would not have modified the invention disclosed in *Feilchenfeld* to incorporate particles coated with a layer of polymer, as disclosed in *Damm*. *Feilchenfeld* teaches an electrically conductive polymer paste comprising metal particles and powders. *Feilchenfeld* at abstract. Specifically, a thermoplastic polymer is dissolved in an organic solvent and mechanically flattened metal flakes are mixed into the dissolved thermoplastic polymer solution "until sufficient to form isotropically conductive joining material during subsequent curing." *Id.* at c. 6, ll. 30-56.

The Office acknowledges that *Feilchenfeld* fails to teach or suggest that the metal flakes are coated with a layer of polymer or monomer, as recited in the subject claims. *Office Action* at p. 6. The Office attempts to remedy this deficiency by citing *Damm*, which teaches polymer-coated metal particles. Applicant respectfully submits, however, that a person skilled in the art reading *Feilchenfeld* would not modify the disclosed invention to include polymer-coated metal particles because the resulting polymer paste and cured polymer material would **not** be electrically conductive. This is

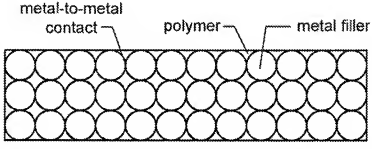
so because the polymer coatings would function as insulating layers that physically separate the individual metal particles and prevent the formation of an "isotropically conductive joining material," as required in *Feilchenfeld*.

Polymers, such as the coating polymers disclosed in *Damm*, are generally known in the art to be electrically insulating. Indeed, this is the technological reason why *Feilchenfeld* teaches adding metal flakes to polymer material, *i.e.*, to provide electrical conductivity to the otherwise electrically insulating polymer material. However, in order to provide electrical conductivity, the metal flakes must form an "isotropically conductive joining material." In other words, *Feilchenfeld* teaches that the metal flakes must be added to the polymer in sufficient levels to produce an isotropic (*i.e.*, uniform in all spatial directions) interconnectivity between the metal flakes so that electrically conductive pathways are formed through the electrically insulating polymer material. *Feilchenfeld* at c. 6, ll. 53-56. Therefore, the individual metal flakes must be capable of forming metal-to-metal contacts when distributed throughout the polymer material.

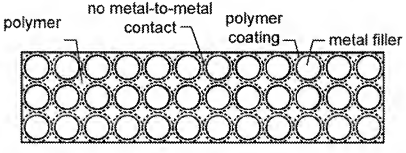
Modifying the invention disclosed in *Feilchenfeld* to incorporate polymer-coated metal particles as disclosed in *Damm* would physically block the formation of the required metal-to-metal contacts and, therefore, would prevent the formation of an "isotropically conductive joining material," as required by the primary reference. This is readily shown schematically:



Cured polymer material with no metal filler; therefore, no electrical conductance through the insulating polymer material



Cured polymer material with isotropically conductive joining metal filler; therefore, electrical conductance through the insulating polymer material (*i.e.*, the invention in *Feilchenfeld*)



Cured polymer material with polymer-coated metal filler; therefore, no electrical conductance through insulating polymer material, which physically blocks the formation of isotropically conductive joining metal filler (*i.e.*, an inoperable modification of *Feilchenfeld* in view of *Damm*)

The prior art can be modified or combined to reject claims as *prima facie* obvious only as long as there is a reasonable expectation of success. MPEP § 2143.02(I). Here, given the general understanding in the art, as evidenced by *Feilchenfeld*, that polymers are electrically insulating, the resultant combination with *Damm* does not establish a *prima facie* case of obviousness because there would be no expectation of success, let alone a reasonable expectation, that polymer-coated particles would impart electrical conductivity to insulating polymer materials. Quite the opposite, insulating polymer materials comprising polymer-coated particles would still be non-conducting because of the lack of electrical contact between the coated particles.

Moreover, as stated in MPEP § 2143.01.V-VI, if a proposed modification would render a prior art invention being modified unsatisfactory for its intended purpose, or change the invention's principle of operation, then the teachings of the cited references are not sufficient to establish a *prima facie* case of obviousness. Here, modifying the invention disclosed in *Feilchenfeld* to incorporate polymer-coated particles as disclosed in *Damm* would render the resulting modified invention electrically non-conductive and, therefore, inoperable for its intended purpose as an electrically conductive polymer material. At the very least, this modification would significantly change in the basic principle under which the *Feilchenfeld* invention was designed to operate because of the lack of electrical interconnectivity among the particles. Further still, *Alexander* does not remedy these deficiencies.

Consequently, the combination of *Feilchenfeld*, *Damm*, and *Alexander* does not establish a *prima facie* case of obviousness for the subject claims. Therefore, Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. § 103(a).

VI. Conclusion

The claims of the *Subject Application* are believed to be in condition for allowance. Applicant respectfully requests favorable reconsideration and allowance of the *Subject Application*.

This Response should not be taken as acquiescence to any of the specific rejections, assertions, statements, and the like, presented in the *Office Action* that are has not explicitly addressed herein. Applicant reserves the right to specifically address all such rejections, assertions, and statements in continuing applications, subsequent responses, and/or appeal or pre-appeal proceedings.

If the undersigned can be of assistance to the Examiner in addressing any additional issues to advance the application to a condition of allowance, please contact the undersigned at the number set forth below.

Respectfully submitted,

Sept. 22, 2011
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